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Elm Spanworm

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The elm spanworm, *Ennomos subsignarius* (Hbn.), is a native insect that has intermittently produced damaging outbreaks in the United States and Canada for over a century. Once considered most destructive to ornamental lindens and elms, it has for a long time been found on a wide variety of forest, shade, and fruit trees. During the mid-19th century it was a periodic menace to the shade trees of the larger cities of the Eastern United States. The spanworm was especially persistent in Brooklyn, N.Y., where it remained active for several decades. Toward the end of that century it became an important orchard pest, and at the same time was discovered defoliating large tracts of hardwood forest. Since the early 1900's severe spanworm defoliation has predominated in forested areas. At least 20 major outbreaks have been recorded, ranging from Georgia to southeastern Quebec.

Distribution

The elm spanworm ranges from the Eastern United States and Canada through the Central States of the Midwest (fig. 1). It has been recorded as far north as Nova Scotia, south to mid-Florida, west to Texas, and Saskatchewan. The male moth is found a considerable distance beyond these limits. Although widely distributed in a given area, spanworm populations are often marked by sudden increases separated by long intervals of pronounced scarcity.

Description of Stages

The eggs are about $\frac{1}{25}$ inch long and when freshly laid are a bright olive green. As winter approaches, they darken and often attain a bronze hue or a grayish cast. The eggs are laid in compact masses of 1 to 250 (fig. 2).

The mature spanworm larva is a smooth, twiglike caterpillar slightly over 2 inches long. Body coloration is variable. Most frequently it is a dull slate black with a bright rusty head capsule. Sometimes, however, the caterpillars may be uniformly green or yellow, or mottled brown, tan, and rose.

The oval pupa is about 0.6 inch long. At its tapered end is a cluster of hooklets that secure the pupa to silk strands attached to a branch or partially eaten leaf while it undergoes transformation to the moth stage. Pupal coloration

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Figure 1.—Generalized geographic distribution of the elm spanworm.

varies from a pale yellow to a dark brown heavily speckled with pepperlike spots.

The adult of each sex is a powdery white moth with a light tan spot in the central area on the underside of each wing. The male moth can be immediately distinguished from the female by its feathery antennae; antennae of the female are beaded and straight. Although only slightly larger than the male, the female has a decidedly stockier abdomen. The total wingspan of the adult is about 1¼ to 1½ inches.

Life History and Habits

The overwintering eggs begin to hatch with the onset of warmer weather in early spring. In the southern Appalachians this occurs toward the end of April and in the Northeast during mid-May or even in early June. The newly hatched "loopers" start feeding on the tender foliage almost immediately. During this time they are sometimes

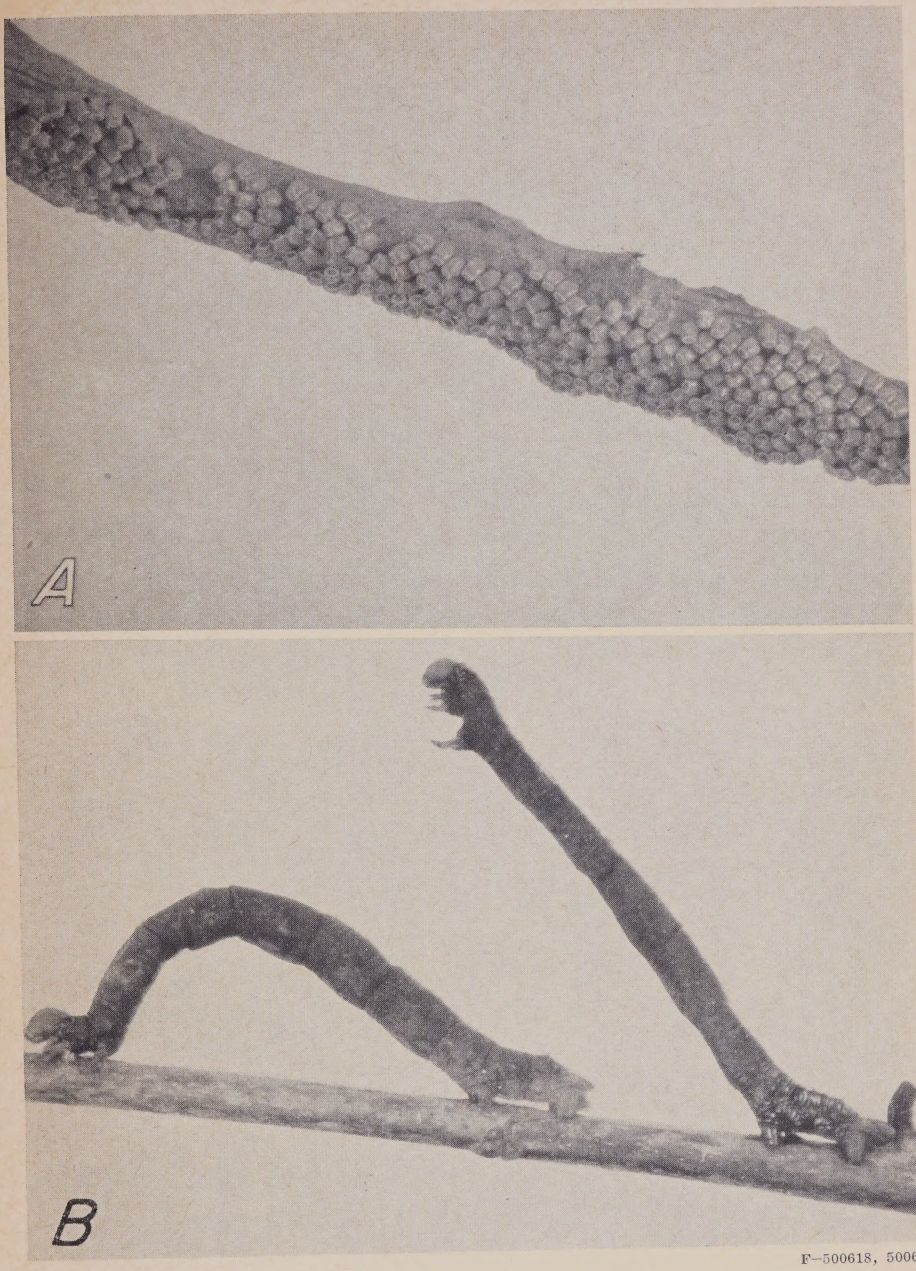

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Figure 2.—Stages of the elm spanworm: *A*, Egg mass; *B*, larvae; (continued on p. 4).

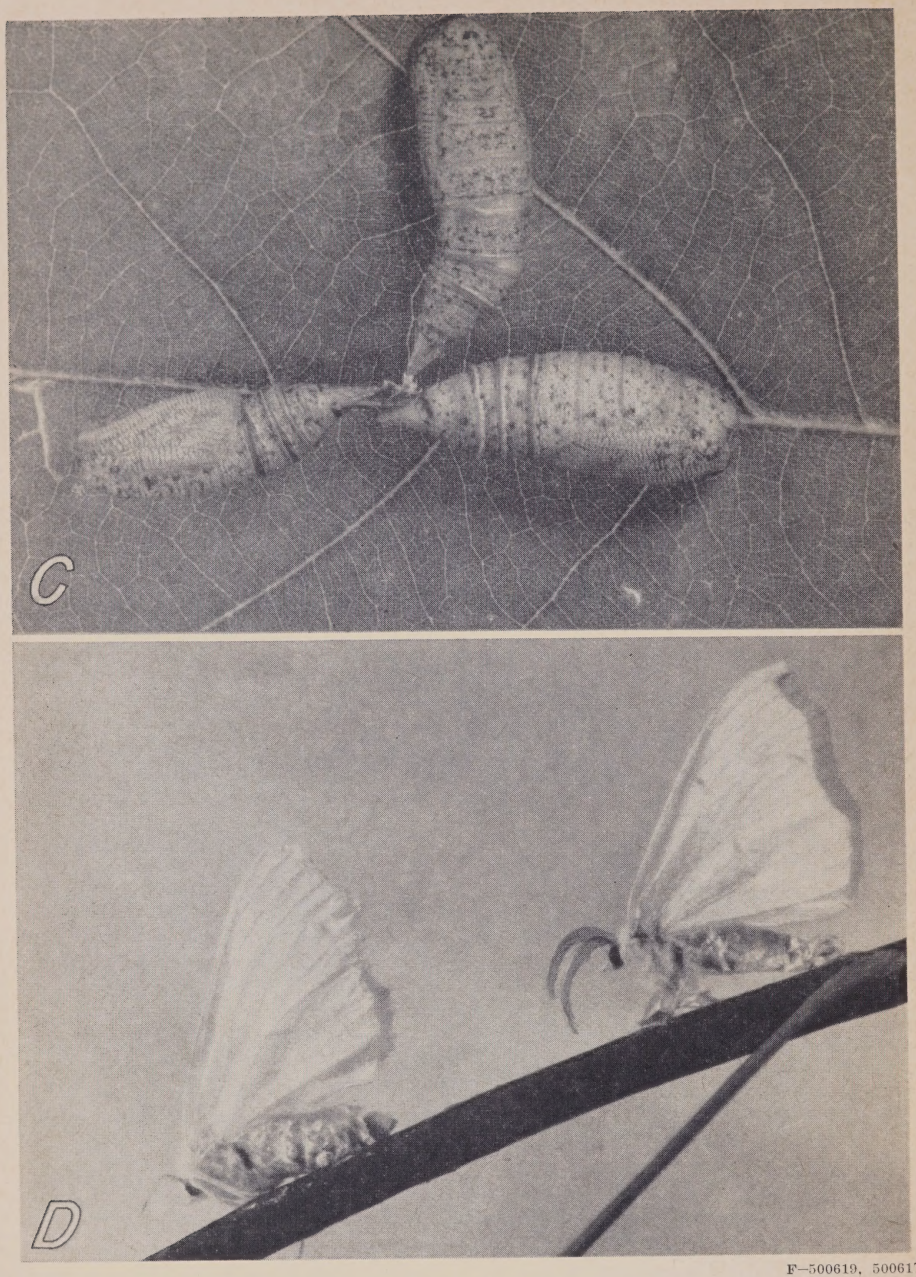

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Figure 2.—Stages of the elm spanworm (con.): C, Pupae; D, female (left) and male (right).

windborne for considerable distances on fine silken threads. This may be an important means of distributing the insect.

As feeding continues, the larva rapidly increases in size and the rate of defoliation rapidly increases. There are five instars, and the period between each successive molt lasts approximately 5 to 10 days. Defoliation is greatest during the final two instars, and frass drop often becomes distinctly audible.

Spanworm larvae are most active on warm, cloudless days. During the feeding period considerable migration takes place through the intersecting tree canopies and by means of threads suspended from leaves or branches. Migration also takes place on the ground. The larvae are gregarious, and dense populations soon center on favored host species. In heavy infestations, however, the larvae quickly spread onto practically all vegetation, stripping the timber and many understory plants as well.

When feeding is completed, the spanworm forms a coarse netlike cocoon of silken threads. These cocoons are usually found on partially consumed leaves where 1 to 10 spanworms may pupate. On totally denuded trees the larva pupates on exposed branch tips, in leaf axils, or drops to the undergrowth. Other suitable pupation sites are bark crevices and old stumps.

After a pupal stage of about 10 days, the adults emerge. Mating soon follows, and the female deposits her eggs in tight irregular masses on the undersides of branches. Shortly after laying her eggs, the female moth dies.

The moths are nocturnal and, superficially, do not appear to be strong fliers. However, during many summer evenings moths in country areas are attracted to the glow of light from distant towns and cities. In towns situated near heavy infestations, mass flights following periods of peak emergence are responsible for occasional so-called mid-summer "snow" showers. Practically all the moths comprising these flights are males.

Host Trees

Elm spanworm caterpillars feed on the foliage of a great variety of trees and shrubs. Although marked feeding preferences are usually apparent, nearly all hardwoods except yellow-poplar are subject to intensive attacks in areas of high larval concentration. The more common trees associated with the spanworm may be arranged into four preference categories:

1. *Highly favored—attacked under almost all circumstances:* ash, hickory, walnut.

2. *Favored—variably attacked; defoliation from 0 to 100 percent:* basswood, beech, buckeye, cherry, chestnut, cottonwood, dogwood, elm, hophornbeam, hornbeam, locust, maple, oak, sweetgum, tupelo, willow.

3. *Less favored—attacked only in severe infestations by mature larvae:* ailanthus, catalpa, kalmia, mulberry, rhododendron, sassafras, sycamore.

4. *Unfavored—rarely attacked:* yellow-poplar.

Damage

The elm spanworm is capable of defoliating vast areas of mixed hardwood forest within a relatively short time. Normally, stripped trees will refoliate later in the season. Radial growth loss may be evident after the first year. Limb dieback and, ultimately, timber mortality often follow two or more successive summers of defoliation. Weakened trees—the oaks in particular—are subject to attack by secondary insects, such as the two-lined chestnut borer, *Agrilus bilineatus* (Web.), resulting in widespread host mortality. Periodically the spanworm produces significant losses to apple crops and seriously weakens valuable shade trees as well.

Severe infestations have occurred both in cities located near sea level and in hardwood swamps. Typically, however, the most intensive feeding takes place on the wooded ridgetops of mountainous areas.

Natural Control

Over 40 different parasites and predators are known to attack spanworm larvae, pupae, and adults. These include such diverse groups as hymenopterons, parasitic flies, birds, spiders, hemipterons, and ground beetles (fig. 3). Overwintering eggs are very resistant to subnormal temperature extremes and are relatively free from parasites as well. Adverse weather conditions have been most effective against developing larval populations locally rather than on an infestationwide basis. Similarly, the overall influence of native disease has rarely been notable in the past. While natural control factors have not prevented outbreaks from occurring, they do help modify the intensity of an infestation.

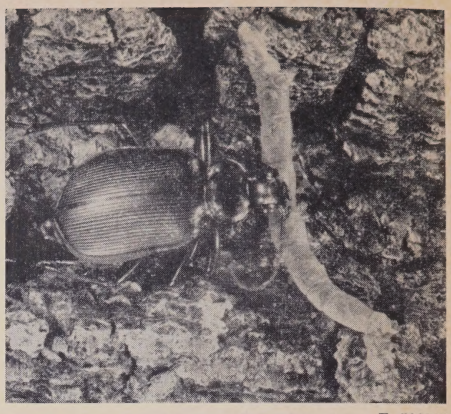

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Figure 3.—Calosoma beetle capturing a spanworm larva.

Applied Control

In the forest, aerial application of DDT at the rate of 1 pound in 1 gallon of fuel oil per acre, especially during early larval feeding when the caterpillars are still small, has provided highly effective control. Recently one-half pound of DDT in 1 gallon of fuel oil per acre was applied by helicopter on an annual basis to suppress infestations in recreation, scenic, and experimental areas.

Shade trees, ornamental shrubs, and orchards may be protected with insecticidal sprays, but applications must be repeated each spring to prevent reinfestation.

Taylor and Tsao (1962) recommend the following insecticides and rate per 100 gallons of water: DDT 50 percent wettable powder, 2 pounds; sevin 50 percent wettable powder, 2 pounds; lead arsenate, 2 pounds; or malathion 25 percent wettable powder, 3 pounds. These formulations may be proportionately modified according to the quantity of insecticide desired and applied in the spring soon after the worms appear. For shrubs and small trees, a hand sprayer is adequate; large trees may require hydraulic sprayers or mist blowers.

Caution

DDT, sevin, lead arsenate, and malathion are poisonous. Store them in plainly labeled containers away from all food products. In handling these chemicals follow the directions and heed the precautions given on the containers. In forest spraying, avoid overdosing, especially over and around streams, ponds, and lakes.

Reference

THE ELM SPANWORM IN GEORGIA APPLE ORCHARDS. Jack Taylor and Ching H. Tsao. Ga. Agr. Res. 3(3) :3–4, 6. 1962.

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